CLAIMS

1. A superalloy component comprising:

a superalloy substrate;

an alumina-containing bond coat layer on the substrate;

an adherent layer of ceramic material forming a thermal barrier coating on the alumina-containing bond coat layer; and

a heat-absorbing topcoat layer applied to the thermal barrier coating, the heat-absorbing topcoat layer comprised of the thermal decomposition product of a mixture comprised of at least one metallic element and at least one ceramic precursor binder component.

2. An article according to claim 1, wherein the topcoat layer has a thickness of between about 2 to about 30 mils.

3. An article according to claim 2, wherein the topcoat layer has a thickness of between about 8 to about 12 mils.

4. An article according to claim 1, wherein the at least one metallic element is selected from the group consisting of alumina, hafnia, tantala, silica, platinum, nickel, iron, cobalt, chromium oxide, and rare earth oxides

5. An article according to claim 1, wherein the at least one ceramic precursor binder component is selected from the group consisting of silicone, alumoxanes, plasticized titanium ethoxide or tantalum ethoxide, and other plasticizable metal organic compounds.

6. An article according to claim 1, wherein upon application and prior to thermal decomposition the topcoat layer is comprised of at least 25 weight percent metallic element, and at least25 weight percent of the ceramic precursor binder.

7. An article according to claim 1, wherein the adherent layer of ceramic material is comprised of between about 3% to about 20% yttrium-stabilized zirconia (YSZ).

8. An article according to claim 1, wherein the overcoat layer is applied by spraying a mixture of the metallic element and the ceramic precursor binder onto the thermal barrier coating followed by heating of the deposited mixture to thermally convert the binder and to oxidize at least a portion of the metallic element to form a continuous topcoat layer.

9. An article according to claim 1, wherein the overcoat layer further comprises at least two thin layers of heat-absorbing material.

10. An article according to claim 9, wherein each thin layer is comprised of a different metallic element.

11. A superalloy article having a thermal barrier coating system, the system comprised of an alumina-containing bond coat layer, an adherent layer of ceramic material forming a thermal barrier coating on the alumina-containing bond coat layer; and a heat-absorbing topcoat layer applied to the thermal barrier coating, the heat-absorbing topcoat layer comprised of the thermal decomposition product of a mixture comprised of at least one metallic element and at least one ceramic precursor organic binder component, the article made in accordance with the method comprising the steps of:

preparing an exposed surface of the thermal barrier coating in order to provide a predetermined roughness of the exposed surface and to remove debris and contaminants from the exposed surface; and

applying a heat-absorbing topcoat layer onto the exposed surface so as to overlie the thermal barrier coating and form a continuous overcoat on the thermal barrier coating.

12. The article according to claim 11, wherein the predetermined roughness is between about 80-125 microinches.

13. The article according to claim 11, wherein the step of preparing the exposed surface comprises measuring the roughness of the exposed surface; determining the difference between the predetermined roughness and the measured roughness; and polishing or roughening the exposed surface based upon the difference until the roughness is about equal to the predetermined roughness.

14. The article according to claim 11, wherein the heat-absorbing overcoat is comprised of a mixture comprising a ceramic precursor in at least 25 weight percent, and a metallic element in at least 25 weight percent.

15. The article according to claim 11, wherein the step of applying is performed using a process selected from the group consisting of spraying, chemical vapor deposition, physical vapor deposition, plasma spraying, and sputtering.

16. The article according to claim 11, wherein step of applying is performed until the overcoat is between about 2 to about 30 mils thick.

17. The article according to claim 11, wherein step of applying is performed until the overcoat is between about 8 to about 12 mils thick.

18. An article according to claim 11, wherein the overcoat layer further comprises at least two thin layers of heat-absorbing material.

19. An article according to claim 18, wherein each separate layer is comprised of a different metallic element.

20. A coated superalloy component for use in the flowpath of a gas turbine engine, the coated component made by the process of:

providing a superalloy component comprising a flowpath part from a gas turbine engine assembly;

applying a thermal barrier coating system, the system comprised of an alumina-containing bond coat layer, an adherent layer of ceramic material forming a thermal barrier coating on the alumina-containing bond coat layer; and

applying a heat-absorbing topcoat layer to the exposed surface of the thermal barrier coating.

21. The coated article made by the process of claim 20, wherein the step of applying a heat-absorbing topcoat layer is comprised of the steps of:

providing a mixture comprised of at least one metallic element and at least one ceramic precursor binder component;

spraying the mixture onto the exposed surface of the thermal barrier coating so as to overlie the thermal barrier coating and form a continuous topcoat on the thermal barrier coating; and

heating the topcoat to a degree sufficient to thermally convert the at least one ceramic precursor binder component and to oxidize at least a portion of the metallic element to yield a heat-absorbing ceramic-metallic matrix topcoat.

22. The coated article made by the process of claim 20, wherein the step of applying a heat-absorbing topcoat layer is comprised of the steps of:

providing at least one metallic element selected from the group consisting of alumina, hafnia, tantala, silica, platinum, nickel, iron, cobalt, chromium oxide, and rare earth oxides; and

depositing the at least one metallic element onto the exposed surface of the thermal barrier coating so as to overlie the thermal barrier coating to form a heat-absorbing topcoat.